Pavel Kishcha:
Good morning!

James Acker:
Morning, Pavel

Morning, Sergei

Sergei Sitnov:
Hi, Jim!

James Acker:
Dr. Kaskaoutis is up first - hopefully he can join us in a moment. I see his colleague has joined.

Hello, Dr. Kaskaoutis - you are now the presenter and can upload your presentation.

Dimitris Kaskaoutis:
hello from me, Thank you Jim

Pavel Kishcha:
Hello Dimitris

Dimitris Kaskaoutis:
Slide 1
Hello from us (Dimitris and Panagiotis). Here, we will present some recently published findings from works conducted over Indian sub-continent, using Giovanni datasets (MODIS, TOMS, OMI, MERRA).
We have been systematically utilizing Giovanni tool from summer 2006 due to its suitability for our research activities and its usefulness to download multiple satellite data over specified regions and periods.

Dimitris Kaskaoutis:
sorry for the delay, I found the way to change the slide

Slide 2
Firstly, we will present some findings concerning the multi-decadal change in surface reaching solar radiation over Indian sub-continent, the well known solar brightening – dimming phenomenon. The slide shows the Giovanni website for MERRA 2D, from which we obtained the dataset for this study.

Slide 3
It describes the study area and period, the data and the examined parameters. We used the net downward shortwave radiation (i) for all sky conditions, (ii) clean skies [without aerosols] and, (iii) clear skies [without clouds]. The cloud optical depth (COD) corresponds to (i) all clouds, (ii) low clouds<700 hPa, (iii) mid-clouds 700-400 hPa, and (iv) high clouds>400 hPa.

Slide 4
Some results are presented here. The main findings are highlighted in the text.

Slide 5
These maps show the spatial distribution for the changes in NDSWR (all skies) during 1979-2004 over Indian subcontinent and adjoining oceanic regions. The results show negative trends, especially over eastern India, Bay of Bengal and Indian Ocean during the monsoon period over these regions (May-October). Note that the cloud cover maximizes over these regions during the monsoon period, so it is assumed that the cloud changes play the major role in multi-decadal variation of solar radiation.

Slide 6
The figure shows the trends in COD averaged over the study region (a) all clouds, (b) high clouds, (c) low clouds and (d) mid clouds. Note the very high increase in COD (high clouds) mainly responsible for the solar dimming over India.

Slide 7
The Table summarizes the results of the mutli-decadal trends in NDSWR for all, clean and clear skies. All parameters show a negative trend.

The above results are recently published in Kambezidis et al. Atmos.Environ. 2012

Slide 8
This corresponds to aerosol measurements over India obtained from Giovanni. The study domain and period as well as the dataset (Terra-MODIS, Level 3) are described.

Slide 9
The figures show the annual variation (area-averaged values) over the whole study domain and over the four specified regions (Arabian Sea, Bay of Bengal, Northern Indian Ocean and Indo-Gangetic Plains).

Slide 10
The maps show the monthly-mean spatial distribution of AOD at 500 nm obtained from Terra-MODIS during the period 2000-2009. Note the very high values over eastern Ganges basin in winter (anthropogenic aerosols), as well as the high values over northwestern India and northern Arabian Sea in May-August (dust). Note here, that the Thar desert influences the northern India and Ganges valley, while the high AODs over Arabian Sea are attributed to dust coming from Arabia and Middle East.

Slide 11
This slide presents the spatial distribution of the Terra-MODIS AOD trend during 2000-2009. Except of the well known AOD increase over India, mainly over Ganges basin during winter due to enhancement of anthropogenic aerosols and black carbon, note a rather “unexpected” declining AOD trend over northern India (especially in northwest) during April-September. This is the period with dominance of dust over the region. So, are the dust changes responsible for these AOD variations??

Slide 12
The figure suggests that western north India (Amritsar) shows larger declining AOD during summer (May-July), while eastern parts (Kolkata) show larger increasing trends in winter. The differences indicate opposite trends in aerosols of different origin, i.e. anthropogenic pollution in east and dust in west.

Slide 13
The AERONET data over Kanpur are in line with MODIS observations, thus justifying the declining AOD trend in May, June and July. Note also the peaks in AOD in monsoon (July 2002)

and pre-monsoon of 2003 (May-June). These high AODs seem to influence the whole decadal trends. Which is the responsible factor for such high AODs?

Slide 14

The explanation is given at this slide. Note the anomaly (large deficit) in precipitation (data from TRMM) in July 2002, May and June 2003 over the arid northwestern India. This has as a direct consequence the increase in dust activity and intensity over the region as well as the higher lifetime of coarse-mode aerosols in the atmosphere (absence of wet removal by precipitation). The MODIS results are in agreement with TRMM rainfall anomalies, showing positive anomalies of AOD over northern India, which is influenced by aerosols originated by Thar desert.

Slide 15

In addition, TOMS shows large values of AI during pre-monsoon and monsoon months of the years 2002 and 2003, which are much higher than the AI mean over the period 1979-2005. This indicates the increase in dust aerosols on 2002 and 2003 over northwestern India (Thar desert).

Slide 16

This slide shows the deep blue MODIS retrievals over Thar desert during 2002 and 2003. See the slide for details. The insect image shows positive anomalies of dust-AOD over Thar in July 2002, May-June 2003 due to increase in dust.

Slide 17

These images are from Landsat and IRS satellites showing a significant increase in crop land areas over arid Rajasthan state due to irrigation facilities from the Indira Gandhi Canal. See slide for extra details.

Slide 18

These are some results from GIOVANNI-MERRA 2D over Rajasthan during the period 1979-2007. The increase in latent heat, specific humidity and the decrease in sensible heat indicate increase in vegetation areas over the arid Rajasthan state. The Giovanni MERRA-2D re-analysis results are in satisfactory agreement with satellite observations, thus rendering Giovanni as a useful tool for hydrological retrievals also!

Slide 19

A proposal on how we can improve Giovanni datasets and Acknowledgments to our colleagues.

James Acker:
Thank you Dr. Kaskaoutis.

Dimitris Kaskaoutis:
Thank you very much for the kind attention, Any questions?

James Acker:
The Thar Desert is in northeastern India, correct?

Dimitris Kaskaoutis:
That's right, it is located in western Rajasthan state

Pavel Kishcha:
What are the long-term AOT trends over northern India during monsoon months without taking into account the dusty years 2002 and 2003?

Dimitris Kaskaoutis:
Dear Pavel, even for including the 2002 and 2003 at the majority of the pixels, the negative trend is not statistically significant although the large declining trend

excluding these two years, the trend seems to be rather neutral.

At any case, no significant, like the increase in winter

James Acker:
I would like to comment that the idea you present is what we have initially tried to do for

variables in our DICCE education Giovanni portal.

Dimitris Kaskaoutis:
this is also an evidence for the increase in dust in monsoon 2002 and pre-monsoon 2003 associated with deficit of rainfall.

This paper is published in JGR you can see D.G. Kaskaoutis, R. Gautam, R.P. Singh, E.E. Houssos, D. Goto, S. Singh, A. Bartzokas, P.G. Kosmopoulos, M. Sharma, N.C. Hsu, B.N. Holben, T. Takemura, 2012. Influence of anomalous dry conditions on aerosols over India: transport, distribution and properties. J. Geophysical Research, 117, D09106, doi:10.1029/2011JD017314.

James Acker:
As Chris Lynnes said discussing Giovanni-4, the plans are to include improved data provenance, an abiding interest of Greg Leptoukh

Note that the reference will be available on our online Workshop page

I also wanted to note that MERRA hydrological variables could be compared to GLDAS hydrological variables

Pavel Kishcha:
About dimming, is COD a reliable parameter? what is it uncertainty?

Dimitris Kaskaoutis:
That will be an excellent work

Dear Pavel, this is a main concern also for me, since I have not found any citation for that or any other information

however, a comparison with MODIS fractions during the recent years so a satisfactory correlation, but I checked also the COD of all clouds

James Acker:
What was COD again?

Dimitris Kaskaoutis:
it is the cloud optical depth

James Acker:
thanks

Pavel Kishcha:
Could Giovanni provide us with info about uncertainty?

Dimitris Kaskaoutis:
it is given from Giovanni at 3 levels

James Acker:
We are working on that - the algorithm groups should be consulted now

Dimitris Kaskaoutis:
Jim, is more expert on that

James Acker:
But I'm an oceanographer!

Dimitris Kaskaoutis:
however, note that solar dimming and brightening, as well as the contribution of clouds are important issues in atmospheric studies

Dimitris Kaskaoutis:
you are more expert on improving Giovanni

James Acker: Yes, we try! Thank you again Dr. Kaskaoutis, for your presentation and your work with Giovanni.